

**ABSTRACT:**  
A thermal conversion pyrolysis reactor system (10) is provided for use in providing a continuous flow type pyrolysis reaction for conversion of carbonizable input materials ("MW") (12). The reactor system (10) utilizes a diffusion material ("MD") (14) which is **preheated** and admixed with the MD (12) in order to facilitate pyrolysis and to partially catalyze reactions. Subsystems are provided to receive gaseous (30), liquid (32) and solid (32) phase outputs. The reactor system (10) includes further component subsystems for waste material MW input (22), MD input (26), reactor chamber (24), and heating (28). The MD (14) is **preheated** by being carried through the reactor chamber (64) prior to admixing with the MW (12) and further by exhaust gases (94) from the furnace space (88) being directed through a heat exchanger (126). The system (10) provides for recycling of MD (14) and is substantially self powered as a result of using combustible hydrocarbon gases produced by the pyrolysis reaction as fuel for turbulent burners (72). Input materials are evacuated of oxygen and a positive internal pressure is maintained in the reactor chamber (66) in order to maximally facilitate oxygen free pyrolysis. The system (10) is particularly adapted for use with **tire** chips, medical waste and industrial plastic waste input materials. Carbon black and pelletized metallic and alloy materials are

preferred MD (14).

2. 5,366,595, Nov. 22, 1994, Mobile apparatus for pyrolyzing carbonaceous material and related method; Michael A. Padgett, et al., 201/19, 25, 30, 33; 202/83, 100, 105, 265; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,366,595 [IMAGE AVAILABLE]

L3: 2 of 8

ABSTRACT:

A loading mechanism places waste material into a porous rotatable cylinder that is mounted for relative rotation within an air-tight housing. Once loaded, the housing is sealed and oxygen is evacuated. A **microwave** heating device heats the waste material within the cylinder and breaks the waste material down into solid and fluid products. A drive motor simultaneously rotates the cylinder at high speed, creating centrifugal force on the waste material. The fluid products escape outwardly from the porous cylinder and are transferred to a heat exchanger chamber where they are cooled. A fractional distillation system stratifies the fluid products according to weight for purposes of recovery.

3. 5,330,623, Jul. 19, 1994, Process of destructive distillation of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,330,623 [IMAGE AVAILABLE]

L3: 3 of 8

ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a **preheat** zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

4. 5,167,772, Dec. 1, 1992, Apparatus for pyrolysis of tires and waste; Thomas H. Parker, Sr., 202/105; 100/232; 201/6, 25; 202/136, 262; 414/173, 198 [IMAGE AVAILABLE]

US PAT NO: 5,167,772 [IMAGE AVAILABLE]

L3: 4 of 8

ABSTRACT:

Method and apparatus for pyrolyzing used tires into a char fraction, wire, fiberglass, oil fraction and gas fraction. The tires are continuously conveyed to a **preheating** chamber where they are heated to a temperature level of 200.degree. F. to 400.degree. F. The heated tires are metered into a cavity having disposed therein a ram system, which shapes and forces the whole **tire** into a pipe which leads to a pyrolyzing chamber. The tires form a plug at the front end of the system to prevent the release of toxic gases into the atmosphere and also to prevent air from entering the pyrolyzing chamber. Similarly, solid residue produced by pyrolysis of the apparatus is forced into a discharge column, forming a plug to seal the system at its outlet end. An alternate embodiment of the invention apparatus operated manually can also be used for compacting, neutralizing and disposing of medical waste, infectious materials and the like as well as auto tires.

5. 5,084,141, Jan. 28, 1992, Process of destructive distillation of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,084,141 [IMAGE AVAILABLE]

L3: 5 of 8

ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolyzed by pre-heating the organic material (without pyrolysis) in a **preheat** zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolyzing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

6. 5,084,140, Jan. 28, 1992, Destruction of macromolecular waste; Kenneth M. Holland, **201/19, 21, 25, 31, 40**; 204/158.21 [IMAGE AVAILABLE]

US PAT NO: 5,084,140 [IMAGE AVAILABLE]

L3: 6 of 8

ABSTRACT:

The macromolecular waste (which is not itself susceptible to **microwave** heating and may be, for example, plastics or polychlorinated biphenyl) is mixed (B) with pulverulent carbonaceous material, which comprises elemental carbon or is degradable by **microwave** irradiation to elemental carbon (such as waste **tire** material). The mix is subjected to **microwave** irradiation (C) in an inert atmosphere to cause pyrolysis of the plastics. Preferably part of the resulting solids is recycled to the **microwave** zone (C).

7. 4,839,151, Jun. 13, 1989, Recovery process; Fred Apffel, 423/449.7; **201/3, 19, 25**; 423/450 [IMAGE AVAILABLE]

US PAT NO: 4,839,151 [IMAGE AVAILABLE]

L3: 7 of 8

ABSTRACT:

A process for economically recovering char, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires may be washed to remove dirt and road film. The tires are dried and **preheated** with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiberglass. The char may be subsequently pyrolyzed with microwaves that elevate the **tire** temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the **tire** pyrolysis is substantially char, fiberglass and steel. The char is mechanically separated from the glass and steel. Alternately, the char and the glass and steel are separated by dumping the hot mixture into a water quench tank. The mixture is cooled. The char floats to the water surface and is removed. The glass and steel sink to the bottom of the tank and are removed separately. The char may be sold or burned or milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

8. 4,647,443, Mar. 3, 1987, Recovery process; Fred Apffel, 423/449.7; **201/2.5**; 423/450; 585/241 [IMAGE AVAILABLE]

US PAT NO: 4,647,443 [IMAGE AVAILABLE]

L3: 8 of 8

ABSTRACT:

A process for economically recovering carbon black, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires are washed to remove dirt and road film. The clean tires are dried and **preheated** with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiber glass. The char is subsequently pyrolyzed with microwaves that elevate the **tire** temperature and devolatilize the remaining

hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage.. The solid residue from the ~~tire~~ pyrolysis is char, fiberglass and steel. The char is mechanically separated from the glass and steel. The char is milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

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L4 36 IRRADIATION AND L1

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1. 5,767,218, Jun. 16, 1998, Metal-nitrogen polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 28 [IMAGE AVAILABLE]

US PAT NO: 5,767,218 [IMAGE AVAILABLE] L4: 1 of 36

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-nitrogen polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-nitrogen polymers, aluminum-nitrogen polymers and boron-nitrogen and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, radiation-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

2. 5,750,628, May 12, 1998, Metal-nitrogen polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 26, 27, 28 [IMAGE AVAILABLE]

US PAT NO: 5,750,628 [IMAGE AVAILABLE] L4: 2 of 36

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-nitrogen polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-nitrogen polymers, aluminum-nitrogen polymers and boron-nitrogen and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one

of thermal-based, radiation-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

3. 5,741,878, Apr. 21, 1998, Metal-nitrogen polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 26, 27, 28 [IMAGE AVAILABLE]

US PAT NO: 5,741,878 [IMAGE AVAILABLE]

L4: 3 of 36

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-nitrogen polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-nitrogen polymers, aluminum-nitrogen polymers and boron-nitrogen and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, radiation-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

4. 5,733,997, Mar. 31, 1998, Metal-nitrogen polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 28 [IMAGE AVAILABLE]

US PAT NO: 5,733,997 [IMAGE AVAILABLE]

L4: 4 of 36

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-nitrogen polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-nitrogen polymers, aluminum-nitrogen polymers and boron-nitrogen and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, radiation-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as

coatings by various techniques onto numerous articles to enhance the articles usefulness.

5. 5,639,414, Jun. 17, 1997, Method and apparatus of manufacturing pneumatic vehicle tires; Klaus Unseld, 264/402; 219/682; 264/326, 489, 490; 425/41, 174.8E [IMAGE AVAILABLE]

US PAT NO: 5,639,414 [IMAGE AVAILABLE]

L4: 5 of 36

ABSTRACT:

A method of manufacturing pneumatic vehicle tires, the tires having a carcass which extends between two bead rings and a breaker arranged between the carcass and a tread, wherein the respective **tire** blank is built up using exclusively non-metallic components, and wherein, in the course of vulcanization and shaping which takes place under the action of heat and pressure, at least a part of the thermal energy that is required is introduced into the **tire** in the form of **microwave** energy. In order to improve the **tire** quality and in particular to avoid defects as a result of incorrect thermal treatment, the temperature which prevails in the **tire** is controlled in different **tire** regions in dependence on the temperature development and differently for different **tire** regions.

6. 5,637,641, Jun. 10, 1997, Metal-nitrogen polymer compositions comprising organic electrophiles; Kurt J. Becker, et al., 525/102, 327.3, 328.2, 328.6, 328.7, 329.4, 330.5, 337, 342, 370, 371, 420, 431, 437, 446, 452, 474, 476 [IMAGE AVAILABLE]

US PAT NO: 5,637,641 [IMAGE AVAILABLE]

L4: 6 of 36

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-nitrogen polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-nitrogen polymers, aluminum-nitrogen polymers and boron-nitrogen and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, radiation-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

7. 5,616,650, Apr. 1, 1997, Metal-nitrogen polymer compositions comprising organic electrophiles; Kurt J. Becker, et al., 525/102, 327.3, 328.2, 328.6, 328.7, 329.4, 330.5, 337, 371, 431, 446, 474, 942 [IMAGE AVAILABLE]

US PAT NO: 5,616,650 [IMAGE AVAILABLE]

L4: 7 of 36

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-nitrogen

polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-nitrogen polymers, aluminum-nitrogen polymers and boron-nitrogen and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, radiation-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

8. 5,591,551, Jan. 7, 1997, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett, et al., 430/18 [IMAGE AVAILABLE]

US PAT NO: 5,591,551 [IMAGE AVAILABLE]

L4: 8 of 36

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a radiation-crosslinkable polymer, and exposing the coated surface to a pattern of radiation to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a radiation reactive group at the para-alkyl group of the para-alkylstyrene.

9. 5,587,261, Dec. 24, 1996, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating; Jay D. Audett, et al., 430/18; 101/395, 401.1; 430/300 [IMAGE AVAILABLE]

US PAT NO: 5,587,261 [IMAGE AVAILABLE]

L4: 9 of 36

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a radiation-crosslinkable polymer, and exposing the coated surface to a pattern of radiation to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a radiation reactive group at the para-alkyl group of the para-alkylstyrene.

10. 5,585,416, Dec. 17, 1996, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett, et al., 522/35; 430/18; 522/160, 904, 905 [IMAGE AVAILABLE]

US PAT NO: 5,585,416 [IMAGE AVAILABLE]

L4: 10 of 36

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a radiation-crosslinkable polymer, and exposing the coated surface to a pattern of radiation to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a radiation reactive group at the para-alkyl group of the para-alkylstyrene.

11. 5,585,225, Dec. 17, 1996, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett, et al.; 430/323, 175, 190, 195, 286.1, 287.1, 296, 325, 329 [IMAGE AVAILABLE]

US PAT NO: 5,585,225 [IMAGE AVAILABLE]

L4: 11 of 36

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a radiation-crosslinkable polymer, and exposing the coated surface to a pattern of radiation to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a radiation reactive group at the para-alkyl group of the para-alkylstyrene.

12. 5,459,174, Oct. 17, 1995, Radiation curable isoolefin copolymers; Natalie A. Merrill, et al.; 522/35; 427/208.4, 507, 520; 522/33, 46, 120, 121, 132, 149, 904, 905; 524/576; 525/70, 71, 72, 73, 76, 87, 301, 301.5, 333.4 [IMAGE AVAILABLE]

US PAT NO: 5,459,174 [IMAGE AVAILABLE]

L4: 12 of 36

ABSTRACT:

A radiation curable functionalized polymer is disclosed. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with an acrylate or a mixture of acrylates and/or a photosensitizer and/or other functional groups at the para-alkyl groups of the para-alkylstyrene.

13. 5,439,031, Aug. 8, 1995, Heat shrinkable end caps; Robert E. Steele, et al.; 138/89, 96R, 178, DIG.1; 264/515 [IMAGE AVAILABLE]

US PAT NO: 5,439,031 [IMAGE AVAILABLE]

L4: 13 of 36

ABSTRACT:

Heat-shrinkable cap comprising a heat-shrinkable tube sealed at one end by heat recovering that end of tube over a dimensionally stable, solid plug. The tube and plug are mutually weldable under heat, or are bonded together, thereby providing an air and water-tight seal at the sealed end. The open end of the cap may be internally coated with adhesive to provide an air and water-tight seal over an object such as a cable-end when the cap is heat recovered over said object.

14. 5,392,529, Feb. 28, 1995, Vibratory bulk material processor and method; Richard G. Bailey, et al.; 34/266, 164, 178, 275 [IMAGE AVAILABLE]

US PAT NO: 5,392,529 [IMAGE AVAILABLE]

L4: 14 of 36

ABSTRACT:

A bulk material processor includes a tray assembly with a panel subassembly having an upper panel section and a lower panel section. The upper panel section is adapted to receive bulk material and pass it to the lower panel section for discharge. A heater panel is mounted over the tray assembly for radiantly heating the bulk material passing thereunder. A vibrator is coupled to the tray assembly for vibrating the bulk material whereby it advances along the tray assembly. A control system is provided for controlling the operation of the vibrator and for controlling the output of the heater panel. A method of bulk material processing includes cascading the bulk material from an upper panel section to a lower panel section by vibration and subjecting it to infrared radiation.



15. 5,387,321, Feb. 7, 1995, Apparatus for waste pyrolysis; Kenneth M. Holland, 202/99, 105, 120, 124 [IMAGE AVAILABLE]

US PAT NO: 5,387,321 [IMAGE AVAILABLE]

L4: 15 of 36

ABSTRACT:

Apparatus and method for the pyrolysis of waste material which is not itself susceptible to heating by **microwave** radiation. The method comprises:

- (a) contacting the waste material, under an atmosphere wherein flame generation is substantially prevented, with a bed of pulverulent carbonaceous material (such as pulverised scrap tires) which is susceptible to heating by **microwave irradiation**; and
- (b) heating the pulverulent material by means of **microwave irradiation** so as to transfer thermal energy from the pulverulent material to the waste material and cause substantial pyrolysis of the waste material.

The apparatus comprises:

- (a) a container 9 which is inert to **microwave** radiation and capable of retaining the bed of pulverulent material;
- (b) a reaction chamber 8;
- (c) a conduit 19 for feeding the waste material to an upper part of the bed of pulverulent material;
- (d) a **microwave** generator 10;
- (e) air locks 12 and 18 for controlling the atmosphere in chamber 8 such that flame generation is prevented in chamber 8; and
- (f) outlet 20 for removal of gases, evolved on pyrolysis of the waste material, from chamber 8.

16. 5,376,503, Dec. 27, 1994, UV/EB curable copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett, et al., 430/270.1, 18, 281.1, 286.1, 905, 913, 915, 916; 522/35, 48, 53, 57, 106, 160, 904, 905 [IMAGE AVAILABLE]

US PAT NO: 5,376,503 [IMAGE AVAILABLE]

L4: 16 of 36

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a radiation-crosslinkable polymer, and exposing the coated surface to a pattern of radiation to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a radiation reactive group at the para-alkyl group of the para-alkylstyrene.

17. 5,346,733, Sep. 13, 1994, Elevated temperature dimensionally stable polyester articles with low gas permeability; Edward J. Dalgewicz, III, et al., 428/35.7; 422/21, 22, 28; 428/34.1, 34.7, 34.9, 36.92, 480; 525/437, 444; 528/272, 298, 308, 308.6 [IMAGE AVAILABLE]

US PAT NO: 5,346,733 [IMAGE AVAILABLE]

L4: 17 of 36

ABSTRACT:

The invention provides for crystalline polyester articles of manufacture having an oxygen permeability of from about 0.2 to about 4.9 cc-mil/100 in.sup.2 -24 hr-atm at a temperature of 23.degree. C. and at 100% relative humidity inside and 60% relative humidity outside, and an enthalpy of recrystallization of from about 0 to about -2.1 cal/g, as well as a linear dimensional shrinkage between about 0% and 6% when heated from about -60.degree. C. to about 200.degree. C. These articles are useful as containers for microwavable, ovenable and/or frozen foods, and have good gas barrier properties, and post-mold dimensional stability from about -60.degree. C. to about 200.degree. C.

18. 5,330,623, Jul. 19, 1994, Process of destructive distillation of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,330,623 [IMAGE AVAILABLE]

L4: 18 of 36

ABSTRACT:

The organic material (such as waste tire compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

19. 5,189,809, Mar. 2, 1993, Vibratory bulk material processing method; Richard G. Bailey, et al., 34/267, 418, 426 [IMAGE AVAILABLE]

US PAT NO: 5,189,809 [IMAGE AVAILABLE]

L4: 19 of 36

ABSTRACT:

A bulk material processor includes a tray assembly with a panel subassembly having an upper panel section and a lower panel section. The upper panel section is adapted to receive bulk material and pass it to the lower panel section for discharge. A heater panel is mounted over the tray assembly for radiantly heating the bulk material passing thereunder. A vibrator is coupled to the tray assembly for vibrating the bulk material whereby it advances along the tray assembly. A control system is provided for controlling the operation of the vibrator and for controlling the output of the heater panel. A method of bulk material processing includes cascading the bulk material from an upper panel section to a lower panel section by vibration and subjecting it to infrared radiation.

20. 5,151,142, Sep. 29, 1992, Heavy duty pneumatic radial tires using rubber reinforcing fiber cords with improved adhesion; Isamu Imai, et al., 152/565, 451, 527, 556; 156/910 [IMAGE AVAILABLE]

US PAT NO: 5,151,142 [IMAGE AVAILABLE]

L4: 20 of 36

ABSTRACT:

Rubber-reinforcing fiber cords are disclosed which are constituted by at least one kind of fibers selected from a group consisting of aromatic polyamide fibers, entire aromatic polyester fibers and polyvinylalcohol fibers having a tenacity of not less than 15 g/d. Spaces among filaments constituting the cord are each impregnated with a rubbery material. Radial tires are also disclosed which each comprise at least one pair of bead wires, at least one carcass ply cord layer and at least one belt ply cord layer. Carcass ply cords and/or belt ply cords are constituted by the above rubber-reinforcing fiber cords.

21. 5,139,873, Aug. 18, 1992, Highly processable aromatic polyamide fibers, their production and use; Serge Rebouillat, 428/375; 8/115.6; 252/8.61, 8.84; 428/378, 395, 911 [IMAGE AVAILABLE]

US PAT NO: 5,139,873 [IMAGE AVAILABLE]

L4: 21 of 36

ABSTRACT:

The invention relates to highly processable aromatic polyamide fibers of high modulus, improved surface frictional properties, improved scourability, low abrasion depositing, low fibrillation and improved longterm antistatic properties having a coating of a lubricant, an emulsifying system, and an antistatic agent, and a process for making such fibers.

22. 5,084,141, Jan. 28, 1992, Process of destructive distillation of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,084,141 [IMAGE AVAILABLE]

L4: 22 of 36

ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolyzed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolyzing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

23. 5,084,140, Jan. 28, 1992, Destruction of macromolecular waste; Kenneth M. Holland, 201/19, 21, 25, 31, 40; 204/158.21 [IMAGE AVAILABLE]

US PAT NO: 5,084,140 [IMAGE AVAILABLE]

L4: 23 of 36

ABSTRACT:

The macromolecular waste (which is not itself susceptible to **microwave** heating and may be, for example, plastics or polychlorinated biphenyl) is mixed (B) with pulverulent carbonaceous material, which comprises elemental carbon or is degradable by **microwave irradiation** to elemental carbon (such as waste **tire** material). The mix is subjected to **microwave irradiation** (C) in an inert atmosphere to cause pyrolysis of the plastics. Preferably part of the resulting solids is recycled to the **microwave** zone (C).

24. 5,036,113, Jul. 30, 1991, **Tire** having radiation cured air barrier coating; Wyndham H. Boon, et al., 522/96, 174; 528/66 [IMAGE AVAILABLE]

US PAT NO: 5,036,113 [IMAGE AVAILABLE]

L4: 24 of 36

ABSTRACT:

A **tire** has on its inner surface an elastomeric air barrier coating, which is formed by photocuring a composition comprising: (a) an end capped prepolymer (MW 2500-10,000) formed by reacting a polyester diol (MW 750-1500) with a diisocyanate, and reacting the resulting diisocyanate terminated prepolymer with an end group forming compound; (b) one or more monofunctional addition polymerizable monomers; and (c) a photoinitiator or mixture thereof. In preferred embodiments, the polyester diol is hydroxyl terminated ethylene adipate, the diisocyanate is TDI, and the end group forming compound is 2-hydroxyethyl methacrylate (HEMA). The monofunctional monomer may be or include N-vinyl-pyrrolidone (NVP). The air barrier coating has high elongation, low modulus, good heat aging resistance and good adhesion to the **tire** in addition to low oxygen permeability.

25. 5,024,145, Jun. 18, 1991, Vibratory bulk material processor and method; Richard G. Bailey, et al., 99/451; 34/266; 99/477, DIG.14 [IMAGE AVAILABLE]

US PAT NO: 5,024,145 [IMAGE AVAILABLE]

L4: 25 of 36

ABSTRACT:

A bulk material processor includes a tray assembly with a panel subassembly having an upper panel section and a lower panel section. The upper panel section is adapted to receive bulk material and pass it to the lower panel section for discharge. A heater panel is mounted over the tray assembly for radiantly heating the bulk material passing thereunder. A vibrator is coupled to the tray assembly for vibrating the bulk

material whereby it advances along the tray assembly. A control system is provided for controlling the operation of the vibrator and for controlling the output of the heater panel. A method of bulk material processing includes cascading the bulk material from an upper panel section to a lower panel section by vibration and subjecting it to infrared radiation.

26. 4,910,295, Mar. 20, 1990, Process for reducing the odor of ethylidene norbornene present in EPDM resin; Robert J. Bernier, et al., 528/482; 524/450, 579; 526/282; 528/490, 501, 502F [IMAGE AVAILABLE]

US PAT NO: 4,910,295 [IMAGE AVAILABLE]

L4: 26 of 36

ABSTRACT:

A process for reducing the odor of ethylidene norbornene present in EPDM resin which comprises introducing a crystalline siliceous molecular sieve into said EPDM resin in an amount sufficient to reduce the odor produced by ethylidene norbornene present in said EPDM resin.

27. 4,904,422, Feb. 27, 1990, Ozone and wear resistance in styrene-butadiene rubber; Joseph Silverman, 264/485; 522/33, 71, 79, 81, 121, 128; 525/284 [IMAGE AVAILABLE]

US PAT NO: 4,904,422 [IMAGE AVAILABLE]

L4: 27 of 36

ABSTRACT:

SBR is treated with sulfur, an optional chemical accelerator and a crosslinking agent, under mild heat, to form a preform having sufficient strength to resist handling. The preform is exposed to substantial **irradiation** on the order of 5-25 Mrad dose of 10 MeV electrons equivalent, which significantly improves wear resistance, tear strength, crack initiation and growth resistance and ozone resistance.

28. 4,874,670, Oct. 17, 1989, **Tire** having cured photopolymer air barrier coating; Wyndham Boon, et al., 428/423.9; 427/507, 520, 521; 428/424.8, 495, 521 [IMAGE AVAILABLE]

US PAT NO: 4,874,670 [IMAGE AVAILABLE]

L4: 28 of 36

ABSTRACT:

A **tire** has on its inner surface an elastomeric air barrier coating, which is formed by photocuring a composition comprising: (a) an end capped prepolymer (MW 2500-10,000) formed by reacting a polyester diol (MW750-1500) with a diisocyanate, and reacting the resulting diisocyanate terminated prepolymer with an end group forming compound; (b) one or more monofunctional addition polymerizable monomers; and (c) a photoinitiator or mixture thereof. In preferred embodiments, the polyester diol is hydroxyl terminated ethylene adipate, the diisocyanate is TDI, and the end group forming compound is 2-hydroxyethyl methacrylate (HEMA). The monofunctional monomer may be or include N-vinyl-pyrrolidone (NVP). The air barrier coating has high elongation, low modulus, good heat aging resistance and good adhesion to the **tire** in addition to low oxygen permeability.

29. 4,860,509, Aug. 29, 1989, Photovoltaic cells in combination with single ply roofing membranes; Heshmat O. Laaly, et al., 52/173.3; 136/245, 251, 291 [IMAGE AVAILABLE]

US PAT NO: 4,860,509 [IMAGE AVAILABLE]

L4: 29 of 36

ABSTRACT:

A combination form of flexible roofing material including a reinforced single-ply membrane base for being adhered to the roof substrate. On the base is laminated a structurally flexible layer of solar cells encapsulated and sealed in a flexible intermediate layer of solar radiation transparent plastic protected by a cover layer of weather-proof

solar transparent plastic. The roofing is constructed for being manufactured in elongate sheets, rolled up for transport to the site and installed by conventional methods including sealing to adjacent sheets of similar single-ply membrane material which may or may not incorporate solar cells. This is continued until the roof covering is complete. Examples are given for reinforced plastic sheet, modified bituminous sheet, and elastomeric sheet roofing materials as well as for a wide variety of solar cells materials together with methods for fabricating these materials into the roofing system disclosed.

30. 4,456,806, Jun. 26, 1984, Method and apparatus for the high frequency preheating of elastomeric products; Toshio Arimatsu, 219/710, 749, 754; 264/489; 425/174.8E [IMAGE AVAILABLE]

US PAT NO: 4,456,806 [IMAGE AVAILABLE]

L4: 30 of 36

ABSTRACT:

The disclosure relates to a method and apparatus for preheating to a predetermined temperature an elastomer product, such as a green **tire**, in preparation for vulcanization. The elastomer product is placed in a lateral posture on a rotatable table within a preheating chamber. While rotating the elastomer product, a high frequency wave **irradiation** is intermittently applied toward the upper surface of the elastomer product through a first waveguide. Simultaneously, additional high frequency wave **irradiation** is intermittently applied onto side portions of the elastomer product through at least one horn member coupled through a corresponding waveguide. The horn member is positioned such that it can be moved vertically or pivoted angularly. The temperature is measured in both a radial and circumferential direction of the elastomer product and maintained uniform during heating by varying the **irradiation** accordingly.

31. 4,285,654, Aug. 25, 1981, Apparatus for continuous tread production; George G. A. Bohm, et al., 426/327; 425/327, 371 [IMAGE AVAILABLE]

US PAT NO: 4,285,654 [IMAGE AVAILABLE]

L4: 31 of 36

ABSTRACT:

An apparatus for the production of a continuous rubber strip which is molded with surface designs, such as **tire** treads, in the uncured state and then cured, after removal from the mold, by heat or radiation is disclosed. In the apparatus the extruded rubber strip is passed between cooperating mold segments carried by respective endless belts which, along with related components, apply suitable temperatures and pressures to the strip to product the surface designs. The molded uncured rubber strip is removed from the molds and then completely cured by radiation and/or heat.

32. 4,233,013, Nov. 11, 1980, Apparatus for producing continuous cured rubber strips; Georg G. A. Bohm, et al., 425/174.4; 156/123; 264/485; 425/384, 404 [IMAGE AVAILABLE]

US PAT NO: 4,233,013 [IMAGE AVAILABLE]

L4: 32 of 36

ABSTRACT:

Apparatus for the production of rubber sheets such as **tire** treads having a surface design in which the rubber in the form of a continuous rubber strip is at least partially cured in a mold. A continuous strip may be cured throughout while held under pressure in design recesses in a mold by radiation curing or may be partially heat-cured throughout and the cure completed by radiation after removal from the mold.

33. 4,230,649, Oct. 28, 1980, Apparatus and method for continuous tread production; George G. A. Bohm, et al., 264/470; 156/96, 129, 130.5, 273.5, 273.7, 275.5; 250/492.3; 264/284, 326, 473, 485, 488, 489; 425/335, 363, 371 [IMAGE AVAILABLE]

## ABSTRACT:

An apparatus and processes for the production of a continuous rubber strip which is molded with surface designs, such as **tire** treads, in the uncured state and then cured, after removal from the mold, by heat or radiation is disclosed. In the apparatus the extruded rubber strip is passed between cooperating mold segments carried by respective endless belts which, along with related components, apply suitable temperatures and pressures to the strip to produce the surface designs. The molded uncured rubber strip is removed from the molds and then completely cured by radiation and/or heat. Process embodiments are also disclosed wherein partial curing of the rubber while in the molding apparatus is performed.

34. 4,131,463, Dec. 26, 1978, Electric recording process of images using electron sensitive layer containing trivalent cobalt complex and compound having conjugated .pi. bond system; Masayoshi Tsuboi, et al., 430/31; 205/54; 430/97, 936 [IMAGE AVAILABLE]

## ABSTRACT:

An image-recording material comprising a support, at least the surface of which is electrically conductive, having on the electric conductive surface a layer of an electron-sensitive composition substantially containing (a) a trivalent cobalt complex compound, (b) a compound having a conjugated .pi. bond system capable of forming at least a bidentate ligand with a divalent or trivalent cobalt ion, and (c) a film-forming organic high polymer, the electron-sensitive composition further containing (d) a compound capable of absorbing electromagnetic waves of a wavelength not longer than about 350 nm as an ultraviolet light absorbing agent, an image-recording process using the image-recording element and an apparatus for forming visible images using the image-recording material.

35. 4,122,137, Oct. 24, 1978, Radiation cure of rubber sheets; Georg G. A. Bohm, et al., 264/470, 166, 236, 284, 326, 347, 474; 522/67, 128, 158 [IMAGE AVAILABLE]

## ABSTRACT:

Process and apparatus for the production of rubber sheets such as **tire** treads having a surface design in which the rubber is at least partially cured in a mold.

36. 4,104,205, Aug. 1, 1978, **Microwave** devulcanization of rubber; Donald S. Novotny, et al., 526/339; 264/489, DIG.46; 521/45.5 [IMAGE AVAILABLE]

## ABSTRACT:

Elastomer waste may be devulcanized without depolymerization to a material capable of recompounding and revulcanization into a product having physical properties essentially equivalent to the original vulcanizate. Devulcanization is accomplished by application of a controlled dose of **microwave** energy to sized material, preferably in a continuous process.

=> d his

(FILE 'USPAT' ENTERED AT 16:44:41 ON 22 JUL 1998)

L1 269 S MICROWAVE AND TIRE

L2 46 S L1 AND PREHEAT?  
L3 8 S L2 AND 201/CLAS  
L4 36 S IRRADIATION AND L1

=> s 12 and 202/clas

11143 202/CLAS  
L5 4 L2 AND 202/CLAS

=> d 15 cit 1-4 ab

1. 5,411,714, May 2, 1995, Thermal conversion pyrolysis reactor system; Arthur C. Wu, et al., 422/232; 110/108, 110, 204, 229, 255; 201/2.5; 202/113, 117, 118, 226; 422/233 [IMAGE AVAILABLE]

US PAT NO: 5,411,714 [IMAGE AVAILABLE] L5: 1 of 4

ABSTRACT:

A thermal conversion pyrolysis reactor system (10) is provided for use in providing a continuous flow type pyrolysis reaction for conversion of carbonizable input materials ("MW") (12). The reactor system (10) utilizes a diffusion material ("MD") (14) which is **preheated** and admixed with the MD (12) in order to facilitate pyrolysis and to partially catalyze reactions. Subsystems are provided to receive gaseous (30), liquid (32) and solid (32) phase outputs. The reactor system (10) includes further component subsystems for waste material MW input (22), MD input (26), reactor chamber (24), and heating (28). The MD (14) is **preheated** by being carried through the reactor chamber (64) prior to admixing with the MW (12) and further by exhaust gases (94) from the furnace space (88) being directed through a heat exchanger (126). The system (10) provides for recycling of MD (14) and is substantially self powered as a result of using combustible hydrocarbon gases produced by the pyrolysis reaction as fuel for turbulent burners (72). Input materials are evacuated of oxygen and a positive internal pressure is maintained in the reactor chamber (66) in order to maximally facilitate oxygen free pyrolysis. The system (10) is particularly adapted for use with **tire** chips, medical waste and industrial plastic waste input materials. Carbon black and pelletized metallic and alloy materials are preferred MD (14).

2. 5,366,595, Nov. 22, 1994, Mobile apparatus for pyrolyzing carbonaceous material and related method; Michael A. Padgett, et al., 201/19, 25, 30, 33; 202/83, 100, 105, 265; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,366,595 [IMAGE AVAILABLE] L5: 2 of 4

ABSTRACT:

A loading mechanism places waste material into a porous rotatable cylinder that is mounted for relative rotation within an air-tight housing. Once loaded, the housing is sealed and oxygen is evacuated. A **microwave** heating device heats the waste material within the cylinder and breaks the waste material down into solid and fluid products. A drive motor simultaneously rotates the cylinder at high speed, creating centrifugal force on the waste material. The fluid products escape outwardly from the porous cylinder and are transferred to a heat exchanger chamber where they are cooled. A fractional distillation system stratifies the fluid products according to weight for purposes of recovery.

3. 5,167,772, Dec. 1, 1992, Apparatus for pyrolysis of tires and waste; Thomas H. Parker, Sr., 202/105; 100/232; 201/6, 25; 202/136, 262; 414/173, 198 [IMAGE AVAILABLE]

US PAT NO: 5,167,772 [IMAGE AVAILABLE] L5: 3 of 4

ABSTRACT:

Method and apparatus for pyrolyzing used tires into a char fraction, wire, fiberglass, oil fraction and gas fraction. The tires are continuously conveyed to a **preheating** chamber where they are heated to a temperature level of 200.degree. F. to 400.degree. F. The heated tires are metered into a cavity having disposed therein a ram system, which shapes and forces the whole **tire** into a pipe which leads to a pyrolyzing chamber. The tires form a plug at the front end of the system to prevent the release of toxic gases into the atmosphere and also to prevent air from entering the pyrolyzing chamber. Similarly, solid residue produced by pyrolysis of the apparatus is forced into a discharge column, forming a plug to seal the system at its outlet end. An alternate embodiment of the invention apparatus operated manually can also be used for compacting, neutralizing and disposing of medical waste, infectious materials and the like as well as auto tires.

4. 5,057,189, Oct. 15, 1991, Recovery apparatus; Fred Apffel,  
202/113, 117, 118; 422/150 [IMAGE AVAILABLE]

US PAT NO: 5,057,189 [IMAGE AVAILABLE]

L5: 4 of 4

ABSTRACT:

An apparatus for economically recovering char, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires may be washed to remove dirt and road film. The tires are dried and **preheated** with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiber glass. The char may be subsequently pyrolyzed with microwaves that elevate the **tire** temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the **tire** pyrolysis is substantially char, fiberglass and steel. The char is mechanically separated from the glass and steel. Alternately, the char and the glass and steel are separated by dumping the hot mixture into a water quench tank. The mixture is cooled. The char floats to the water surface and is removed. The glass and steel sink to the bottom of the tank and are removed separately. The char may be sold or burned or milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

=> s purge gas or nitrogen

25327 PURGE  
466315 GAS  
3268 PURGE GAS  
(PURGE (W) GAS)

270983 NITROGEN  
COMMAND INTERRUPTED

=> s l1 and nitrogen

270983 NITROGEN  
L6 89 L1 AND NITROGEN

=> s l6 and waveguide

18998 WAVEGUIDE  
L7 2 L6 AND WAVEGUIDE

=> d l7 cit 1-2 ab

1. 5,523,283, Jun. 4, 1996, L.sub.a AlO.sub.3 Substrate for copper oxide



superconductors; Randy W. Simon, et al., 505/239; 427/62; 428/702, 930;  
505/190, 238, 701, 702 [IMAGE AVAILABLE]

US PAT NO: 5,523,283 [IMAGE AVAILABLE]

L7: 1 of 2

ABSTRACT:

A lanthanum aluminate (LaAlO<sub>3</sub>) substrate on which thin films of layered perovskite copper oxide superconductors are formed. Lanthanum aluminate, with a pseudo-cubic perovskite crystal structure, has a crystal structure and lattice constant that closely match the crystal structures and lattice constants of the layered perovskite superconductors. Therefore, it promotes epitaxial film growth of the superconductors, with the crystals being oriented in the proper direction for good superconductive electrical properties, such as a high critical current density. In addition, LaAlO<sub>3</sub> has good high frequency properties, such as a low loss tangent and low dielectric constant at superconductive temperatures. Finally, lanthanum aluminate does not significantly interact with the superconductors. Lanthanum aluminate can also be used to form thin insulating films between the superconductor layers, which allows for the fabrication of a wide variety of superconductor circuit elements.

2. 3,908,933, Sep. 30, 1975, Guided missile; Wilbur H. Goss, et al.,  
244/3.21; 60/270.1 [IMAGE AVAILABLE]

US PAT NO: 3,908,933 [IMAGE AVAILABLE]

L7: 2 of 2

ABSTRACT:

1. An aerial missile including, in combination, an airframe comprising a plurality of connected body assemblies having duct sections defining a duct extending throughout the length of the body and having a wall, said wall providing an inlet, a diffuser communicating with the inlet, a combustion chamber communicating with the diffuser and an exit nozzle communicating with the combustion chamber, a cowl lip connecting the forwardmost body assembly and the wall of the forwardmost duct section at their corresponding forward ends, wings on the airframe and mounted for rocking movement about their root axes, longitudinally spaced partitions surrounding the duct wall and defining a compartment, an explosive charge in the compartment and surrounding the duct, a fuze system for the charge, and means mounted on one of the partitions and operable for imparting rocking movement to the wings.

=> d his

(FILE 'USPAT' ENTERED AT 16:44:41 ON 22 JUL 1998)

L1 269 S MICROWAVE AND TIRE  
L2 46 S L1 AND PREHEAT?  
L3 8 S L2 AND 201/CLAS  
L4 36 S IRRADIATION AND L1  
L5 4 S L2 AND 202/CLAS  
L6 89 S L1 AND NITROGEN  
L7 2 S L6 AND WAVEGUIDE

=> s l1 and 201/clas

3521 201/CLAS  
L8 9 L1 AND 201/CLAS

=> d l8 cit 1-9 ab

1. 5,411,714, May 2, 1995, Thermal conversion pyrolysis reactor system;  
Arthur C. Wu, et al., 422/232; 110/108, 110, 204, 229, 255; 201/2.5;  
202/113, 117, 118, 226; 422/233 [IMAGE AVAILABLE]

## ABSTRACT:

A thermal conversion pyrolysis reactor system (10) is provided for use in providing a continuous flow type pyrolysis reaction for conversion of carbonizable input materials ("MW") (12). The reactor system (10) utilizes a diffusion material ("MD") (14) which is preheated and admixed with the MD (12) in order to facilitate pyrolysis and to partially catalyze reactions. Subsystems are provided to receive gaseous (30), liquid (32) and solid (32) phase outputs. The reactor system (10) includes further component subsystems for waste material MW input (22), MD input (26), reactor chamber (24), and heating (28). The MD (14) is preheated by being carried through the reactor chamber (64) prior to admixing with the MW (12) and further by exhaust gases (94) from the furnace space (88) being directed through a heat exchanger (126). The system (10) provides for recycling of MD (14) and is substantially self powered as a result of using combustible hydrocarbon gases produced by the pyrolysis reaction as fuel for turbulent burners (72). Input materials are evacuated of oxygen and a positive internal pressure is maintained in the reactor chamber (66) in order to maximally facilitate oxygen free pyrolysis. The system (10) is particularly adapted for use with **tire** chips, medical waste and industrial plastic waste input materials. Carbon black and pelletized metallic and alloy materials are preferred MD (14).

2. 5,366,595, Nov. 22, 1994, Mobile apparatus for pyrolyzing carbonaceous material and related method; Michael A. Padgett, et al., **201/19, 25, 30, 33**; 202/83, 100, 105, 265; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,366,595 [IMAGE AVAILABLE]

L8: 2 of 9

## ABSTRACT:

A loading mechanism places waste material into a porous rotatable cylinder that is mounted for relative rotation within an air-tight housing. Once loaded, the housing is sealed and oxygen is evacuated. A **microwave** heating device heats the waste material within the cylinder and breaks the waste material down into solid and fluid products. A drive motor simultaneously rotates the cylinder at high speed, creating centrifugal force on the waste material. The fluid products escape outwardly from the porous cylinder and are transferred to a heat exchanger chamber where they are cooled. A fractional distillation system stratifies the fluid products according to weight for purposes of recovery.

3. 5,364,821, Nov. 15, 1994, Producing active carbon using **microwave** discharge; Kenneth M. Holland, 502/5; **201/19**; 502/416, 437, 522 [IMAGE AVAILABLE]

US PAT NO: 5,364,821 [IMAGE AVAILABLE]

L8: 3 of 9

## ABSTRACT:

A method of producing active carbon by **microwave**-induced pyrolysis of a carbonaceous material in an atmosphere wherein flame generation is prevented. The resulting product is treated with an acid to wash out sulphur or metal values and then activated with superheated steam and/or carbon dioxide at an elevated temperature.

4. 5,330,623, Jul. 19, 1994, Process of destructive distillation of organic material; Kenneth M. Holland, **201/19, 25, 29, 32, 35**; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,330,623 [IMAGE AVAILABLE]

L8: 4 of 9

## ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

5. 5,167,772, Dec. 1, 1992, Apparatus for pyrolysis of tires and waste; Thomas H. Parker, Sr., 202/105; 100/232; **201/6, 25**; 202/136, 262; 414/173, 198 [IMAGE AVAILABLE]

US PAT NO: 5,167,772 [IMAGE AVAILABLE]

L8: 5 of 9

ABSTRACT:

Method and apparatus for pyrolyzing used tires into a char fraction, wire, fiberglass, oil fraction and gas fraction. The tires are continuously conveyed to a preheating chamber where they are heated to a temperature level of 200.degree. F. to 400.degree. F. The heated tires are metered into a cavity having disposed therein a ram system, which shapes and forces the whole **tire** into a pipe which leads to a pyrolyzing chamber. The tires form a plug at the front end of the system to prevent the release of toxic gases into the atmosphere and also to prevent air from entering the pyrolyzing chamber. Similarly, solid residue produced by pyrolysis of the apparatus is forced into a discharge column, forming a plug to seal the system at its outlet end. An alternate embodiment of the invention apparatus operated manually can also be used for compacting, neutralizing and disposing of medical waste, infectious materials and the like as well as auto tires.

6. 5,084,141, Jan. 28, 1992, Process of destructive distillation of organic material; Kenneth M. Holland, **201/19, 25, 29, 32, 35**; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,084,141 [IMAGE AVAILABLE]

L8: 6 of 9

ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolyzed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolyzing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

7. 5,084,140, Jan. 28, 1992, Destruction of macromolecular waste; Kenneth M. Holland, **201/19, 21, 25, 31, 40**; 204/158.21 [IMAGE AVAILABLE]

US PAT NO: 5,084,140 [IMAGE AVAILABLE]

L8: 7 of 9

ABSTRACT:

The macromolecular waste (which is not itself susceptible to **microwave** heating and may be, for example, plastics or polychlorinated biphenyl) is mixed (B) with pulverulent carbonaceous material, which comprises elemental carbon or is degradable by **microwave** irradiation to elemental carbon (such as waste **tire** material). The mix is subjected to **microwave** irradiation (C) in an inert atmosphere to cause pyrolysis of the plastics. Preferably part of the resulting solids is recycled to the **microwave** zone (C).

8. 4,839,151, Jun. 13, 1989, Recovery process; Fred Apffel, 423/449.7; **201/3, 19, 25**; 423/450 [IMAGE AVAILABLE]

## ABSTRACT:

A process for economically recovering char, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires may be washed to remove dirt and road film. The tires are dried and preheated with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiberglass. The char may be subsequently pyrolyzed with microwaves that elevate the **tire** temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the **tire** pyrolysis is substantially char, fiberglass and steel. The char is mechanically separated from the glass and steel. Alternately, the char and the glass and steel are separated by dumping the hot mixture into a water quench tank. The mixture is cooled. The char floats to the water surface and is removed. The glass and steel sink to the bottom of the tank and are removed separately. The char may be sold or burned or milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

9. 4,647,443, Mar. 3, 1987, Recovery process; Fred Apffel, 423/449.7; 201/2.5; 423/450; 585/241 [IMAGE AVAILABLE]

## ABSTRACT:

A process for economically recovering carbon black, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires are washed to remove dirt and road film. The clean tires are dried and preheated with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiber glass. The char is subsequently pyrolyzed with microwaves that elevate the **tire** temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the **tire** pyrolysis is char, fiberglass and steel. The char is mechanically separated from the glass and steel. The char is milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

=> s 11 and 202/clas

11143 202/CLAS

L9 6 L1 AND 202/CLAS

=> d 19 cit 1-6 ab

1. 5,523,330, Jun. 4, 1996, Process for producing a foamed isocyanate-based polymer; Paul V. Farkas, 521/49; 202/264; 521/49.5, 76, 99, 155, 170 [IMAGE AVAILABLE]

## ABSTRACT:

A process for producing a foamed isocyanate-based polymer based on an amount of water and an amount of catalyst, the process comprising the steps of: providing a first stream comprising a particulate, non-cellular filler material surrounded by a mixture comprising less than 100% by weight of the amount of water and less than 100% by weight of the amount catalyst; providing a second stream comprising an active hydrogen-containing compound and the remainder of the amount of water and

the amount of catalyst; providing a thin stream comprising an isocyanate; feeding each of the first stream, the second stream and the third stream-independently of one another to a mixing device; mixing the first stream, the second stream and the third stream in the mixing device to produce a reaction mixture; and allowing the reaction mixture to expand to produce the foamed isocyanate-based polymer. A system for alternating between production of filled or unfilled isocyanate-base foam is also provided.

2. 5,411,714, May 2, 1995, Thermal conversion pyrolysis reactor system; Arthur C. Wu, et al., 422/232; 110/108, 110, 204, 229, 255; 201/2.5; 202/113, 117, 118, 226; 422/233 [IMAGE AVAILABLE]

US PAT NO: 5,411,714 [IMAGE AVAILABLE]

L9: 2 of 6

ABSTRACT:

A thermal conversion pyrolysis reactor system (10) is provided for use in providing a continuous flow type pyrolysis reaction for conversion of carbonizable input materials ("MW") (12). The reactor system (10) utilizes a diffusion material ("MD") (14) which is preheated and admixed with the MD (12) in order to facilitate pyrolysis and to partially catalyze reactions. Subsystems are provided to receive gaseous (30), liquid (32) and solid (32) phase outputs. The reactor system (10) includes further component subsystems for waste material MW input (22), MD input (26), reactor chamber (24), and heating (28). The MD (14) is preheated by being carried through the reactor chamber (64) prior to admixing with the MW (12) and further by exhaust gases (94) from the furnace space (88) being directed through a heat exchanger (126). The system (10) provides for recycling of MD (14) and is substantially self powered as a result of using combustible hydrocarbon gases produced by the pyrolysis reaction as fuel for turbulent burners (72). Input materials are evacuated of oxygen and a positive internal pressure is maintained in the reactor chamber (66) in order to maximally facilitate oxygen free pyrolysis. The system (10) is particularly adapted for use with tire chips, medical waste and industrial plastic waste input materials. Carbon black and pelletized metallic and alloy materials are preferred MD (14).

3. 5,387,321, Feb. 7, 1995, Apparatus for waste pyrolysis; Kenneth M. Holland, 202/99, 105, 120, 124 [IMAGE AVAILABLE]

US PAT NO: 5,387,321 [IMAGE AVAILABLE]

L9: 3 of 6

ABSTRACT:

Apparatus and method for the pyrolysis of waste material which is not itself susceptible to heating by **microwave** radiation. The method comprises:

- (a) contacting the waste material, under an atmosphere wherein flame generation is substantially prevented, with a bed of pulverulent carbonaceous material (such as pulverised scrap tires) which is susceptible to heating by **microwave** irradiation; and
- (b) heating the pulverulent material by means of **microwave** irradiation so as to transfer thermal energy from the pulverulent material to the waste material and cause substantial pyrolysis of the waste material.

The apparatus comprises:

- (a) a container 9 which is inert to **microwave** radiation and capable of retaining the bed of pulverulent material;
- (b) a reaction chamber 8;
- (c) a conduit 19 for feeding the waste material to an upper part of the bed of pulverulent material;
- (d) a **microwave** generator 10;
- (e) air locks 12 and 18 for controlling the atmosphere in chamber 8 such that flame generation is prevented in chamber 8; and
- (f) outlet 20 for removal of gases, evolved on pyrolysis of the waste material, from chamber 8.

4. 5,366,595, Nov. 22, 1994, Mobile apparatus for pyrolyzing carbonaceous material and related method; Michael A. Padgett, et al., 201/19, 25, 30, 33; **202/83, 100, 105, 265**; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,366,595 [IMAGE AVAILABLE]

L9: 4 of 6

ABSTRACT:

A loading mechanism places waste material into a porous rotatable cylinder that is mounted for relative rotation within an air-tight housing. Once loaded, the housing is sealed and oxygen is evacuated. A **microwave** heating device heats the waste material within the cylinder and breaks the waste material down into solid and fluid products. A drive motor simultaneously rotates the cylinder at high speed, creating centrifugal force on the waste material. The fluid products escape outwardly from the porous cylinder and are transferred to a heat exchanger chamber where they are cooled. A fractional distillation system stratifies the fluid products according to weight for purposes of recovery.

5. 5,167,772, Dec. 1, 1992, Apparatus for pyrolysis of tires and waste; Thomas H. Parker, Sr., **202/105**; 100/232; 201/6, 25; **202/136, 262**; 414/173, 198 [IMAGE AVAILABLE]

US PAT NO: 5,167,772 [IMAGE AVAILABLE]

L9: 5 of 6

ABSTRACT:

Method and apparatus for pyrolyzing used tires into a char fraction, wire, fiberglass, oil fraction and gas fraction. The tires are continuously conveyed to a preheating chamber where they are heated to a temperature level of 200.degree. F. to 400.degree. F. The heated tires are metered into a cavity having disposed therein a ram system, which shapes and forces the whole **tire** into a pipe which leads to a pyrolyzing chamber. The tires form a plug at the front end of the system to prevent the release of toxic gases into the atmosphere and also to prevent air from entering the pyrolyzing chamber. Similarly, solid residue produced by pyrolysis of the apparatus is forced into a discharge column, forming a plug to seal the system at its outlet end. An alternate embodiment of the invention apparatus operated manually can also be used for compacting, neutralizing and disposing of medical waste, infectious materials and the like as well as auto tires.

6. 5,057,189, Oct. 15, 1991, Recovery apparatus; Fred Apffel, **202/113, 117, 118**; 422/150 [IMAGE AVAILABLE]

US PAT NO: 5,057,189 [IMAGE AVAILABLE]

L9: 6 of 6

ABSTRACT:

An apparatus for economically recovering char, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires may be washed to remove dirt and road film. The tires are dried and preheated with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiber glass. The char may be subsequently pyrolyzed with microwaves that elevate the **tire** temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the **tire** pyrolysis is substantially char, fiberglass and steel. The char is mechanically separated from the glass and steel. Alternately, the char and the glass and steel are separated by dumping the hot mixture into a water quench tank. The mixture is cooled. The char floats to the water surface and is removed. The glass and steel sink to the bottom of the tank and are removed separately. The char may be sold or burned or milled to break down agglomerates and subsequently

pelletized and bagged. The steel and glass are discarded as trash.

=> s l1 and 422/clas

49806 422/CLAS  
L10 4 L1 AND 422/CLAS

=> d l10 cit 1-4

1. 5,615,949, Apr. 1, 1997, High pressure mixing system and process for producing foamed isocyanate-based polymers containing filler material; Nick Morano, et al., 366/159.1, 162.5; **422/133** [IMAGE AVAILABLE]

2. 5,411,714, May 2, 1995, Thermal conversion pyrolysis reactor system; Arthur C. Wu, et al., **422/232**; 110/108, 110, 204, 229, 255; 201/2.5; 202/113, 117, 118, 226; **422/233** [IMAGE AVAILABLE]

3. 5,346,733, Sep. 13, 1994, Elevated temperature dimensionally stable polyester articles with low gas permeability; Edward J. Dalgewicz, III, et al., 428/35.7; **422/21**, **22**, **28**; 428/34.1, 34.7, 34.9, 36.92, 480; 525/437, 444; 528/272, 298, 308, 308.6 [IMAGE AVAILABLE]

4. 5,057,189, Oct. 15, 1991, Recovery apparatus; Fred Apffel, 202/113, 117, 118; **422/150** [IMAGE AVAILABLE]

=> s l1 and nitrogen

270983 NITROGEN  
L11 89 L1 AND NITROGEN

=> s l11 radiation

MISSING OPERATOR 'L11 RADIATION'

=> s l11 and radiation

168672 RADIATION  
L12 44 L11 AND RADIATION

=> s l12 and distil?

186582 DISTIL?  
L13 24 L12 AND DISTIL?

=> d l13 cit 1-24 ab

1. 5,767,218, Jun. 16, 1998, Metal-**nitrogen** polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 28 [IMAGE AVAILABLE]

US PAT NO: 5,767,218 [IMAGE AVAILABLE]

L13: 1 of 24

#### ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-**nitrogen** polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-**nitrogen** polymers, aluminum-**nitrogen** polymers and boron-**nitrogen** and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the

compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, **radiation**-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

2. 5,760,118, Jun. 2, 1998, End use applications of biodegradable polymers; Richard G. Sinclair, et al., 524/306; 523/124; 524/310, 315, 317, 320; 528/354, 361 [IMAGE AVAILABLE]

US PAT NO: 5,760,118 [IMAGE AVAILABLE]

L13: 2 of 24

ABSTRACT:

Disclosed are products made of degradable materials which include a hydrolytically degradable polymer. The degradable materials can be internally or externally modified. The internally modified polymer composition has polymers modified by the use of comonomers having a relatively high molecular weight. The externally modified polymer composition includes a modifier, wherein the modifier is compatible with the polymer and the modifier is nontoxic, nonvolatile and nonfugitive. The various degradable materials include films, fibers, extruded and molded products, laminates, foams, powders, nonwovens, adhesives and coatings. The disclosed materials are particularly useful for the production of a variety of products in high volumes which are suitable for recycling after use or which are discarded into the environment in large volumes.

3. 5,750,628, May 12, 1998, Metal-**nitrogen** polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 26, 27, 28 [IMAGE AVAILABLE]

US PAT NO: 5,750,628 [IMAGE AVAILABLE]

L13: 3 of 24

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-**nitrogen** polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-**nitrogen** polymers, aluminum-**nitrogen** polymers and boron-**nitrogen** and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, **radiation**-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

4. 5,747,598, May 5, 1998, Epoxidized solid elastomeric copolymers; Thomas S. Coolbaugh, et al., 525/314 [IMAGE AVAILABLE]



## ABSTRACT:

An epoxidized linear block copolymer which prior to epoxidation comprises at least one triblock I--B--I, wherein I is a block of a polymerized conjugated diene of at least 5 carbon atoms, such as isoprene, and B is a block of a polymer of a conjugated diene, different from that polymerized to form the I blocks, of at least 4 carbon atoms, such as 1,3-butadiene. The B block may be selectively hydrogenated before or after epoxidation so that they contain substantially no ethylenic unsaturation, while the epoxidation reaction forms epoxy groups from double bonds in the I blocks. Also disclosed is an alternative epoxidized solid linear block copolymer which prior to epoxidation contains at least one triblock wherein the first polymer block is a copolymer of an aryl-substituted olefin, such as styrene, and the conjugated diene used to polymerize the block I, the second or middle block is a polymer of the diene used to polymerize the block B, and the third polymer block is the same as the first polymer block. In this alternative copolymer, the middle block may also be selectively hydrogenated, so that it contains substantially no ethylenic unsaturation while the epoxidation reaction forms epoxy groups from double bonds in the first and third blocks. The disclosure also includes epoxidized solid linear random copolymers and solid star-branched block and random copolymers made from the same monomers as the linear block copolymers, and methods for producing the foregoing epoxidized polymers.

5. 5,741,878, Apr. 21, 1998, Metal-**nitrogen** polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 26, 27, 28 [IMAGE AVAILABLE]

US PAT NO: 5,741,878 [IMAGE AVAILABLE]

L13: 5 of 24

## ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-**nitrogen** polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-**nitrogen** polymers, aluminum-**nitrogen** polymers and boron-**nitrogen** and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, **radiation**-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

6. 5,733,997, Mar. 31, 1998, Metal-**nitrogen** polymer compositions comprising organic electrophiles; Kurt Joseph Becker, et al., 528/25, 28 [IMAGE AVAILABLE]

US PAT NO: 5,733,997 [IMAGE AVAILABLE]

L13: 6 of 24

## ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2)

at least one metal-containing polymer comprising a metal-**nitrogen** polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-**nitrogen** polymers, aluminum-**nitrogen** polymers and boron-**nitrogen** and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, **radiation**-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

7. 5,712,039, Jan. 27, 1998, Epoxy adhesives with dithiooxamide adhesion promoters; Virginia C. Marhevka, et al., 428/414; 427/207.1, 372.2; 428/416; 523/453, 461; 525/504, 505, 523; 528/90, 93, 381, 390 [IMAGE AVAILABLE]

US PAT NO: 5,712,039 [IMAGE AVAILABLE]

L13: 7 of 24

ABSTRACT:

The invention provides a curable, structural epoxy adhesive composition comprising: (a) an epoxy resin; (b) a curing agent for the epoxy resin; and (c) a compound of the formula I: ##STR1## in which R.sup.1 and R.sup.2, which may be the same or different, are selected from an alkyl group, a hydroxyalkyl group, a cycloalkyl group, an aryl group, an arylalkyl group, or a heterocyclic group in which the one to three non-carbon atoms in the ring are independently selected from S, N, and O.

8. 5,637,641, Jun. 10, 1997, Metal-**nitrogen** polymer compositions comprising organic electrophiles; Kurt J. Becker, et al., 525/102, 327.3, 328.2, 328.6, 328.7, 329.4, 330.5, 337, 342, 370, 371, 420, 431, 437, 446, 452, 474, 476 [IMAGE AVAILABLE]

US PAT NO: 5,637,641 [IMAGE AVAILABLE]

L13: 8 of 24

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-**nitrogen** polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-**nitrogen** polymers, aluminum-**nitrogen** polymers and boron-**nitrogen** and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, **radiation**-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

9. 5,616,650, Apr. 1, 1997, Metal-**nitrogen** polymer compositions comprising organic electrophiles; Kurt J. Becker, et al., 525/102, 327.3, 328.2, 328.6, 328.7, 329.4, 330.5, 337, 371, 431, 446, 474, 942 [IMAGE AVAILABLE]

US PAT NO: 5,616,650 [IMAGE AVAILABLE]

L13: 9 of 24

ABSTRACT:

The compositions of this invention comprise uncrosslinked reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one metal-containing polymer comprising a metal-**nitrogen** polymer.

Preferred compositions of this invention comprise reaction mixtures comprising (1) at least one organic monomer, oligomer or polymer comprising a multiplicity of organic, electrophilic substituents, and (2) at least one of: silicon-**nitrogen** polymers, aluminum-**nitrogen** polymers and boron-**nitrogen** and polymer combinations thereof comprising a multiplicity of sequentially bonded repeat units the compositions comprising the reaction products of the reaction mixtures, and the compositions obtained by crosslinking the reaction products of the reaction mixtures. The crosslinking may be effected through at least one of thermal-based, **radiation**-based free radical-based or ionic-based crosslinking mechanisms. Furthermore, the reaction mixtures, the composition comprising the reaction products and the crosslinked composition may further comprise at least one filler or reinforcement. The composition may be molded or shaped by various techniques into numerous useful articles. Furthermore, the compositions may be applied as coatings by various techniques onto numerous articles to enhance the articles usefulness.

10. 5,591,551, Jan. 7, 1997, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett, et al., 430/18 [IMAGE AVAILABLE]

US PAT NO: 5,591,551 [IMAGE AVAILABLE]

L13: 10 of 24

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a **radiation**-crosslinkable polymer, and exposing the coated surface to a pattern of **radiation** to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a **radiation** reactive group at the para-alkyl group of the para-alkylstyrene.

11. 5,587,261, Dec. 24, 1996, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating; Jay D. Audett, et al., 430/18; 101/395, 401.1; 430/300 [IMAGE AVAILABLE]

US PAT NO: 5,587,261 [IMAGE AVAILABLE]

L13: 11 of 24

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a **radiation**-crosslinkable polymer, and exposing the coated surface to a pattern of **radiation** to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a **radiation** reactive group at the para-alkyl group of the para-alkylstyrene.

12. 5,585,416, Dec. 17, 1996, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett,

US PAT NO: 5,585,416 [IMAGE AVAILABLE]

L13: 12 of 24

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a **radiation**-crosslinkable polymer, and exposing the coated surface to a pattern of **radiation** to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a **radiation** reactive group at the para-alkyl group of the para-alkylstyrene.

13. 5,585,225, Dec. 17, 1996, UV/EB curable butyl copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett, et al., 430/323, 175, 190, 195, 286.1, 287.1, 296, 325, 329 [IMAGE AVAILABLE]

US PAT NO: 5,585,225 [IMAGE AVAILABLE]

L13: 13 of 24

ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a **radiation**-crosslinkable polymer, and exposing the coated surface to a pattern of **radiation** to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a **radiation** reactive group at the para-alkyl group of the para-alkylstyrene.

14. 5,492,179, Feb. 20, 1996, System for extinguishing a fire in a volume for delivery from a distance; Yechiel Spector, et al., 169/26; 252/305 [IMAGE AVAILABLE]

US PAT NO: 5,492,179 [IMAGE AVAILABLE]

L13: 14 of 24

ABSTRACT:

A system for extinguishing a fire in a volume includes a fire extinguishing device for delivery from a distance into communication with the volume, the device including a composition which includes a first reactant and a second reactant. The composition is activated so as to cause the first reactant and the second reactant to react with each other to create solid particulate products having a diameter of about one micron or less which are effective in extinguishing fires. The device includes a convoluted path defined by a plurality of metal protrusions through which the products are made to travel, the path serving as a flame arrestor.

15. 5,459,174, Oct. 17, 1995, **Radiation** curable isoolefin copolymers; Natalie A. Merrill, et al., 522/35; 427/208.4, 507, 520; 522/33, 46, 120, 121, 132, 149, 904, 905; 524/576; 525/70, 71, 72, 73, 76, 87, 301, 301.5, 333.4 [IMAGE AVAILABLE]

US PAT NO: 5,459,174 [IMAGE AVAILABLE]

L13: 15 of 24

ABSTRACT:

A **radiation** curable functionalized polymer is disclosed. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with an acrylate or a mixture of acrylates and/or a photosensitizer and/or other functional groups at the para-alkyl groups of the para-alkylstyrene.

16. 5,444,113, Aug. 22, 1995, End use applications of biodegradable polymers; Richard G. Sinclair, et al., 524/306; 523/124; 524/310, 315,

US PAT NO: 5,444,113 [IMAGE AVAILABLE]

L13: 16 of 24

## ABSTRACT:

Disclosed are products made of degradable materials which include a hydrolytically degradable polymer. The degradable materials can be internally or externally modified. The internally modified polymer composition has polymers modified by the use of comonomers having a relatively high molecular weight. The externally modified polymer composition includes a modifier, wherein the modifier is compatible with the polymer and the modifier is nontoxic, nonvolatile and nonfugitive. The various degradable materials include films, fibers, extruded and molded products, laminates, foams, powders, nonwovens, adhesives and coatings. The disclosed materials are particularly useful for the production of a variety of products in high volumes which are suitable for recycling after use or which are discarded into the environment in large volumes.

17. 5,416,711, May 16, 1995, Infra-red sensor system for intelligent vehicle highway systems; Richard Gran, et al., 701/117; 340/905, 933; 701/118 [IMAGE AVAILABLE]

US PAT NO: 5,416,711 [IMAGE AVAILABLE]

L13: 17 of 24

## ABSTRACT:

An infra-red sensor system for all weather, day and night traffic surveillance of ground based vehicles. The infra-red sensor system comprises system comprises an infra-red, focal plane array detector, signal processors, a communications interface and a central computer. The infra-red, focal plane array detector senses the heat emitted from vehicles passing within the field of view. Information collected from the array detector is input to signal processors which are programmed with tracking algorithms and other application specific algorithms to extract and calculate meaningful traffic data from the infra-red image captured by the array detector. The meaningful data includes the location, speed and acceleration of all vehicles passing within the field of view of the array detector. The information from the signal processors is transmitted to the central computer via the communications interface for further processing and dissemination of information.

18. 5,410,051, Apr. 25, 1995, Vinyl-terminated and carbamylmethylated **nitrogen**-containing heterocyclic compounds; Peter S. Forgione, et al., 544/196, 197, 200, 205, 206, 208; 548/303.4 [IMAGE AVAILABLE]

US PAT NO: 5,410,051 [IMAGE AVAILABLE]

L13: 18 of 24

## ABSTRACT:

Disclosed are novel **nitrogen** containing heterocyclic compounds and novel vinyl terminated polyurethane/polyamide polymers together with the use of both of these compounds in a novel adhesive and coating composition. The **nitrogen** containing heterocyclic compounds of the invention contain two vinyl-terminated substituents and at least one carbamylmethyl substituent and have a nucleus selected from melamine, oligomers of melamine, benzoguanamine, and oligomers of benzoguanamine, glycoluril and oligomers of glycoluril, cyclohexylguanamine, oligomers of cyclohexylguanamine, acetoguanamine, and oligomers of acetoguanamine. The vinyl terminated polyurethane compounds of the invention have a molecular weight of from about 3000 to about 80000, and contain at least two vinyl end groups.

19. 5,376,503, Dec. 27, 1994, UV/EB curable copolymers for lithographic and corrosion-resistant coating applications; Jay D. Audett, et al., 430/270.1, 18, 281.1, 286.1, 905, 913, 915, 916; 522/35, 48, 53, 57, 106, 160, 904, 905 [IMAGE AVAILABLE]

## ABSTRACT:

A lithographic coating and method of framing a lithographic image are disclosed. The method comprises coating at least a portion of a surface of an article with a **radiation**-crosslinkable polymer, and exposing the coated surface to a pattern of **radiation** to crosslink the polymer in a lithographic image. The functionalized polymer is a copolymer of an isoolefin of 4 to 7 carbon atoms and para-alkylstyrene, wherein the para-alkylstyrene is functionalized with a **radiation** reactive group at the para-alkyl group of the para-alkylstyrene.

20. 5,359,014, Oct. 25, 1994, Vinyl-terminated carbamylmethylated melamines, vinyl-terminated polyurethane/polyamide polymers and coating/adhesive compositions containing same; Peter S. Forgione, et al., 525/455, 454, 920 [IMAGE AVAILABLE]

US PAT NO: 5,359,014 [IMAGE AVAILABLE]

L13: 20 of 24

## ABSTRACT:

Disclosed are novel **nitrogen** containing heterocyclic compounds and novel vinyl terminated polyurethane/polyamide polymers together with the use of both of these compounds in a novel adhesive and coating composition. The **nitrogen** containing heterocyclic compounds of the invention contain two vinyl-terminated substituents and at least one carbamylmethyl substituent and have a nucleus selected from melamine, oligomers of melamine, benzoguanamine, and oligomers of benzoguanamine, glycoluril and oligomers of glycoluril. The vinyl terminated polyurethane compounds of the invention have a molecular weight of from about 3000 to about 80000, and contain at least two vinyl end groups.

21. 5,175,201, Dec. 29, 1992, Vinyl-terminated carbamylmethylated melamines, vinyl-terminated polyurethane/polyamide polymers and coating/adhesive compositions containing same; Peter S. Forgione, et al., 524/257, 271, 323, 340, 347, 358, 394, 396; 525/426, 454, 455 [IMAGE AVAILABLE]

US PAT NO: 5,175,201 [IMAGE AVAILABLE]

L13: 21 of 24

## ABSTRACT:

Disclosed are novel **nitrogen** containing heterocyclic compounds and novel vinyl terminated polyurethane/polyamide polymers together with the use of both of these compounds in a novel adhesive and coating composition. The **nitrogen** containing heterocyclic compounds of the invention contain two vinyl-terminated substituents and at least one carbamylmethyl substituent and have a nucleus selected from melamine, oligomers of melamine, benzoguanamine, and oligomers of benzoguanamine, glycoluril and oligomers of glycoluril. The vinyl terminated polyurethane compounds of the invention have a molecular weight of from about 3000 to about 80000, and contain at least two vinyl end groups.

22. 5,036,113, Jul. 30, 1991, **Tire** having **radiation** cured air barrier coating; Wyndham H. Boon, et al., 522/96, 174; 528/66 [IMAGE AVAILABLE]

US PAT NO: 5,036,113 [IMAGE AVAILABLE]

L13: 22 of 24

## ABSTRACT:

A **tire** has on its inner surface an elastomeric air barrier coating, which is formed by photocuring a composition comprising: (a) an end capped prepolymer (MW 2500-10,000) formed by reacting a polyester diol (MW750-1500) with a diisocyanate, and reacting the resulting diisocyanate terminated prepolymer with an end group forming compound; (b) one or more monofunctional addition polymerizable monomers; and (c) a photoinitiator or mixture thereof. In preferred embodiments, the polyester diol is hydroxyl terminated ethylene adipate, the diisocyanate is TDI, and the

end group forming compound is 2-hydroxyethyl methacrylate (HEMA). The monofunctional monomer may be or include N-vinyl-pyrrolidone (NVP). The air barrier coating has high elongation, low modulus, good heat aging resistance and good adhesion to the **tire** in addition to low oxygen permeability.

23. 4,983,278, Jan. 8, 1991, Pyrolysis methods with product oil recycling; Chang Y. Cha, et al., 208/407, 415, 427; 423/449.7; 585/241 [IMAGE AVAILABLE]

US PAT NO: 4,983,278 [IMAGE AVAILABLE]

L13: 23 of 24

ABSTRACT:

A two step retorting process for pyrolyzing a solid feed selected from the group consisting of oil shale, tar sand, waste motor oil, and scrap tires to recover valuable products therefrom comprising retorting a mixture of the solid feed in heavy oil at a relatively low temperature, recycling the oil formed back to the first step, and completing the pyrolysis of the residue formed at a higher temperature in the absence of product oil recycling. Apparatus is provided including a means for feeding and soaking the solid feed, a HSPR, an IFBC, and means for handling product liquid and gas.

24. 4,874,670, Oct. 17, 1989, **Tire** having cured photopolymer air barrier coating; Wyndham Boon, et al., 428/423.9; 427/507, 520, 521; 428/424.8, 495, 521 [IMAGE AVAILABLE]

US PAT NO: 4,874,670 [IMAGE AVAILABLE]

L13: 24 of 24

ABSTRACT:

A **tire** has on its inner surface an elastomeric air barrier coating, which is formed by photocuring a composition comprising: (a) an end capped prepolymer (MW 2500-10,000) formed by reacting a polyester diol (MW750-1500) with a diisocyanate, and reacting the resulting diisocyanate terminated prepolymer with an end group forming compound; (b) one or more monofunctional addition polymerizable monomers; and (c) a photoinitiator or mixture thereof. In preferred embodiments, the polyester diol is hydroxyl terminated ethylene adipate, the diisocyanate is TDI, and the end group forming compound is 2-hydroxyethyl methacrylate (HEMA). The monofunctional monomer may be or include N-vinyl-pyrrolidone (NVP). The air barrier coating has high elongation, low modulus, good heat aging resistance and good adhesion to the **tire** in addition to low oxygen permeability.

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(FILE 'USPAT' ENTERED AT 16:44:41 ON 22 JUL 1998)

L1 269 S MICROWAVE AND TIRE  
L2 46 S L1 AND PREHEAT?  
L3 8 S L2 AND 201/CLAS  
L4 36 S IRRADIATION AND L1  
L5 4 S L2 AND 202/CLAS  
L6 89 S L1 AND NITROGEN  
L7 2 S L6 AND WAVEGUIDE  
L8 9 S L1 AND 201/CLAS  
L9 6 S L1 AND 202/CLAS  
L10 4 S L1 AND 422/CLAS  
L11 89 S L1 AND NITROGEN  
L12 44 S L11 AND RADIATION  
L13 24 S L12 AND DISTIL?

=> file epo

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=> s 11

10479 MICROWAVE  
 8503 TIRE  
 L14 12 MICROWAVE AND TIRE

=> d 114 cit 1-12 ab

1. US005486319A , Jan. 23, 1996, **Tire** cure control system and  
 method; STONE, W ROSS (US), et al.,  
 INT-CL: [6] B29C35/04; [6] G01N22/00

US005486319A

L14: 1 of 12

ABSTRACT:

A **tire** cure control system and method characterized by a computer-based data acquisition and process control unit that uses non-invasive, direct cure measurements to adjust the length of cure so that all cured articles such as tires will be cured to the same extent in the minimum amount of time, thereby to maximize production while providing uniformly cured products. The unit generally includes at least one **microwave** probe, although preferably multiple **microwave** probes, placed in the mold and a processor to process probe data and to initiate a control action principally initiating a mold opening sequence at the optimal time. Initiation of the mold opening sequence at least in part is based upon a measurement of the time rate of change of the attenuation of **microwave** energy caused by the curing rubber compound in the mold.

2. US005330623A , Jul. 19, 1994, Process of destructive distillation of organic material; HOLLAND, KENNETH M (GB),  
 INT-CL: [5] C10B53/00  
 EUR-CL: C10B53/00

US005330623A

L14: 2 of 12

ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

3. US005316224A , May 31, 1994, Method and apparatus for recovering elastomeric material; DOBOZY, JOHN (AU),  
 INT-CL: [5] C08J11/04  
 EUR-CL: B29B17/02; C08J11/06

US005316224A

L14: 3 of 12

ABSTRACT:



PCT No. PCT/AU90/00484 Sec. 371 Date Jun. 10, 1992 Sec. 102(e) Date Jun. 10, 1992 PCT Filed Oct. 10, 1990 PCT Pub. No. WO91/05818 PCT Pub. Date May 2, 1991. A method for recovering elastomeric material such as rubber from tires comprising the steps of soaking the tires in a mixture of liquids in tanks which soften the rubber, subjecting the softened tires to shear conditions in the rubber, and recovering the rubber and drying it in a drier. In this method grinding of the **tire** is not required. The recovered dried rubber can be carbonized in a **microwave** chamber to form a substitute for products such as carbon black formed by burning fossil fuels. A screw conveyor provides the preferred means to remove the softened rubber by a shearing action.

4. US005216372A , Jun. 1, 1993, **Microwave** steel belt location sensor for tires; ,  
INT-CL: E01C23/00; G01M17/02  
EUR-CL: G01B15/02

US005216372A

L14: 4 of 12

#### ABSTRACT:

The thickness of the layers of rubber covering the steel belts within a **tire** can be measured by transmitting a **microwave** signal toward the outer surface of the **tire** and measuring the phase shift of the signal reflected by the **tire**. In the preferred embodiment, a waveguide is used to direct the **microwave** signal toward the **tire**. A standing wave is created within the waveguide by interference between the transmitted **microwave** signal and the **microwave** signal reflected from the **tire**. A series of crystal detectors mounted along the length of the waveguide measure the standing wave. A processor calculates the phase of the reflection coefficient, and determines the thickness of the rubber layer as a predetermined function of the phase. By proper selection of the **microwave** frequency and the spacing between the waveguide and the **tire**, the rubber layer thickness can be uniquely determined as a function of phase for any range of rubber thicknesses likely to be encountered in a **tire**. In addition, a phase reversal (from 180 DEG to - 180 DEG ) can be arranged to occur at a specific rubber thickness by proper selection of these parameters. This can be used in the **tire** retreading process to halt buffing when a predetermined minimum rubber thickness has been reached.

5. EP000529790A1, Mar. 3, 1993, **Microwave** steel belt location sensor for tires.; ZOUGHI, REZA (US), et al.,  
INT-CL: G01B15/02  
EUR-CL: G01B15/02

EP000529790A1

L14: 5 of 12

#### ABSTRACT:

The thickness of the layers of rubber covering the steel belts within a **tire** can be measured by transmitting a **microwave** signal toward the outer surface of the **tire** and measuring the phase shift of the signal reflected by the **tire**. In the preferred embodiment, a waveguide is used to direct the **microwave** signal toward the **tire**. A standing wave is created within the waveguide by interference between the transmitted **microwave** signal and the **microwave** signal reflected from the **tire**. A series of crystal detectors mounted along the length of the waveguide measure the standing wave. A processor calculates the phase of the reflection coefficient, and determines the thickness of the rubber layer as a predetermined function of the phase. By proper selection of the **microwave** frequency and the spacing between the waveguide and the **tire**, the rubber layer thickness can be

uniquely determined as a function of phase for any range of rubber thicknesses likely to be encountered in a **tire**. In addition, a phase reversal (from 180 DEG to -180 DEG ) can be arranged to occur at a specific rubber thickness by proper selection of these parameters. This can be used in the **tire** retreading process to halt buffing when a predetermined minimum rubber thickness has been reached. <IMAGE>

6. US004957945A , Sep. 18, 1990, Preparation of ultra high molecular weight polyester; COHN, GERALD (US),  
INT-CL: C08G63/00  
EUR-CL: C08G63/80; C08J9/28

US004957945A

L14: 6 of 12

ABSTRACT:

There is a growing demand for high molecular weight polyester resin. For instance, the market for high molecular weight polyethylene terephthalate resin is rapidly expanding. High molecular polyethylene terephthalate resin is currently being used in vast quantities in manufacturing bottles for carbonated beverages, trays for frozen foods which can be heated in either **microwave** ovens or convection ovens, and in **tire** cord. There is a growing trend toward higher molecular weights in many applications for such polyester resins. Unfortunately, it becomes progressively more difficult and expensive to produce polyester resins having higher and higher molecular weights utilizing standard commercial polymerization techniques. This invention discloses a technique by which polyester resin having extremely high molecular weight can be prepared utilizing a very rapid solid state polymerization process. This invention more specifically discloses a process for preparing ultra-high molecular weight polyester resin which comprises: (1) dissolving a polyester prepolymer in a suitable organic solvent; (2) recovering the polyester prepolymer from the organic solvent to produce a porous, fibrous mass of the polyester prepolymer; and (3) solid state polymerizing the porous, fibrous mass at an elevated temperature to produce the ultra-high molecular weight polyester resin.

7. EP000335819A2, Oct. 4, 1989, Preparation of ultra-high molecular weight polyester.; COHN, GERALD,  
INT-CL: C08G63/18; C08G63/26; C08J9/28  
EUR-CL: C08J9/28

EP000335819A2

L14: 7 of 12

ABSTRACT:

There is a growing demand for high molecular weight polyester resin. For instance, the market for high molecular weight polyethylene terephthalate resin is rapidly expanding. High molecular polyethylene terephthalate resin is currently being used in vast quantities in manufacturing bottles for carbonated beverages, trays for frozen foods which can be heated in either **microwave** ovens or convection ovens, and in **tire** cord. There is a growing trend toward higher molecular weights in many applications for such polyester resins. Unfortunately, it becomes progressively more difficult and expensive to produce polyester resins having higher and higher molecular weights utilizing standard commercial polymerization techniques. This application discloses a technique by which polyester resin having extremely high molecular weight can be prepared utilizing a very rapid solid state polymerization process. This application more specifically discloses a process for preparing ultra-high molecular weight polyester resin which comprises: (1) dissolving a polyester prepolymer in a suitable organic solvent; (2) recovering the polyester prepolymer from the organic solvent to produce a porous, fibrous mass of the polyester prepolymer; and (3) solid state

polymerizing the porous, fibrous mass at an elevated temperature to produce the ultra-high molecular weight polyester resin.

8. US004557775A , Dec. 10, 1985, Tie-gum layer for retreading vehicle tires; BERGGREN, BENNY (SE), et al.,  
EUR-CL: B29D30/54; B29D30/56; B29D30/58

US004557775A

L14: 8 of 12

ABSTRACT:

<CHG DATE=19940730 STATUS=O>A tie-gum layer for retreading vehicle tires. In carrying forth retreading of a vehicle **tire**, a prevulcanized carcass is provided with a prevulcanized tread and an unvulcanized tie-gum layer between the carcass and tread. A **microwave** applicator is located above the tread for emitting microwaves to the tires for creating heat energy in the **tire**. A reflector for microwaves comprising an electrically conductive material is provided in association with the tie-gum layer for providing high quality rapid vulcanization without heating the carcass.

9. US004536242A , Aug. 20, 1985, Method and apparatus for retreading vehicle tires; GRIPEHOLT, NINNEH (SE), et al.,  
EUR-CL: B29D30/56

US004536242A

L14: 9 of 12

ABSTRACT:

<CHG DATE=19940730 STATUS=O>A method and apparatus for retreading vehicle tires. A carcass is provided with a prevulcanized tread and an unvulcanized tie-gum layer between the carcass and tread. A **microwave** applicator is located above the tread to emit microwaves against the **tire** for generating heat energy in the **tire** whereby the tie-gum layer is vulcanized. Vulcanization of the edges of the tie-gum layer is facilitated by local heating at or in connection with said edges by heat generation outside of the **tire**. The heating can be effected either by utilizing a material with a high dissipation factor for **microwave** energy or, alternatively, by use of electric resistance wires.

10. US004224624A , Sep. 23, 1980, Detection of properly positioned movable objects; EVANS, EDWARD N,  
INT-CL: G01S3/02  
EUR-CL: E04H6/14; E04H6/42; G01V15/00

US004224624A

L14: 10 of 12

ABSTRACT:

Electromagnetic radiation position detection system and method are disclosed for detecting when a movable object is located at a predetermined position. In a preferred embodiment, polarized **microwave** radiation emitted from a source fixed relative to the movable object is rotated when the object is in an aligned position and a detector fixed with respect to the movable object and located opposite the fixed source provides a signal when substantially only the rotated, polarized radiation is detected. In one particular embodiment, a plurality of conveyor pans which are part of a car parking tower is the movable object and each pan carries a waveguide which rotates the **microwave** radiation propagated therethrough. The conveyor pan also has a wheel well with a switch located therein and which, when depressed by the **tire** of a properly located car on the conveyor pan acts to block the radiation from being detected.

process of vulcanization is completed.

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22. JP356057929A , May 20, 1981, **TIRE** AIR PRESSURE MEASURING DEVICE  
USING **MICROWAVE**; MITSUSE, TAKUZO,  
INT-CL: G01L17/00  
ADDITIONAL-INT-CL: B60C23/02

JP356057929A

L15: 22 of 23

ABSTRACT:

PURPOSE: To realize a measurement for the **tire** air pressure while the car is running, by installing a pressure-sensitive device into a **tire** to respond to the air pressure within the **tire** and thus makes the **microwave** reflector rise up.

CONSTITUTION: The pressure-sensitive device 7 which detects the pressure reduction down to the air pressure set previously is installed into the **tire** 4, along with the **microwave** reflector 5 which is made to rise up by the detector 7. At the same time, the **microwave** oscillator 1 and the receiver 2 are provided outside the **tire** 4. Then the **microwave** is transmitted to detect the presence or absence of the reflected wave, thus detecting the state of the air pressure within the **tire**. And if the reflected wave of the transmitted **microwave** is detected, a reduction of air pressure within the **tire** can be decided.

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23. JP356051342A , May 8, 1981, **MICROWAVE** HEATER FOR **TIRE**;  
OKAKURA, SHINJI, et al.,  
INT-CL: B29H5/02

JP356051342A

L15: 23 of 23

ABSTRACT:

PURPOSE: To control the central part of thick part of the **tire** at the highest temperature rise characteristics for making vulcanization easier by a method in which the **microwave** is irradiated onto the **tire** through a concave mirror in such a manner as to focus it on the thick inside of the **tire**.

CONSTITUTION: The concave mirror 3 is provided at a given interval in the face of the thick part 2 of the **tire** 1 and a **microwave** irradiator is provided on the first focus 4 inside the mirror 3. In the system, **microwave** energy from the irradiator is reflected at the mirror 3 to focus as the second focus 5 inside the **tire** 1. Since the distance from the irradiator to the **tire** is sufficiently longer than the wave length of **microwave**, most of the energy is centered on the second focus 5, whereby permitting the central part of the thick part of the **tire** to be effectively heated. As needed, the flat mirror 6 is provided between the concave mirror 3 and the **tire** 1 for convenience.

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11. US004157930A , Jun. 12, 1979, Method of retreading vehicle tires using **microwave** heating; BJORKMAN, LEIF A B (SE), et al.,  
INT-CL: B29H17/36  
EUR-CL: B29D30/54; B29D30/56

US004157930A

L14: 11 of 12

ABSTRACT:

<CHG DATE=19940730 STATUS=O>A process and a rubber-base bonding material in the form of a preformed strip for retreading vehicle tires using a prevulcanized tread and **microwave** heating for vulcanizing and binding the bonding strip to the **tire** carcass and to the tread is disclosed, wherein a bonding strip is used whose dielectric loss factor at the vulcanizing (retreading) temperature is higher than the loss factor of the prevulcanized tread, so that the **microwave** heat applied will be concentrated to the bonding strip and vulcanize the same providing satisfactory adhesion between carcass and tread without the already prevulcanized tread being destroyed or significantly reduced in quality due to the effect of the excess heat.

12. US003867606A , Feb. 18, 1975, **Microwave** heating apparatus for rotatable articles; PETERSON, ROBERT A,  
INT-CL: H05B9/06  
EUR-CL: H05B6/80; B29D30/00

US003867606A

L14: 12 of 12

ABSTRACT:

An applicator is provided in combination with a **microwave** nonradiant energy source having means for automatically sensing and maintaining a predetermined distance with respect to the article being heated. In one embodiment a **tire** having a nonuniform cross-sectional contour is continuously rotated and axially displaced while the sensor means contact the outer surfaces of the tread to track the disposition of the **tire** relative to an energy applicator such as a horn radiator mounted on a motorized cart. Electromechanical actuators and limiters are incorporated with the sensor means to generate electrical data to control the movement of the energy radiator in a forward and backward direction. Another embodiment comprises a motorized cart arrangement with a sloped track bearing the sensor and energy radiator means utilizing the force of gravity to maintain contact.

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=> s 11

15142 MICROWAVE  
17418 TIRE  
L15 23 MICROWAVE AND TIRE

=> d 115 cit 1-23 ab

reinjection into the reactor chamber.

2. 5,607,487, Mar. 4, 1997, Bottom feed - updraft gasification system; Ieland T. Taylor, 48/111, 76, 86A, 128 [IMAGE AVAILABLE]

US PAT NO: 5,607,487 [IMAGE AVAILABLE]

L3: 2 of 13

ABSTRACT:

A gasification system for solid wastes having a thermal reactor and a mechanical gas cleaner, an indirect heat exchange cooler, and an electrostatic precipitator for cleaning and cooling the produced gas. Feed material is continuously fed to the central section of the thermal reactor above an air introduction manifold and nozzles and in an upward direction, forming a stratified charge. As feed material moves upward and outward from the reactor center it is reduced to ash. An agitator assures contact between the hot particulate product and hot gases resulting in gasification of the feed material and net movement to the sidewall of the thermal reactor, forming ash. The air introduction nozzles serve as a grate. Ash descends along the sidewall to the reactor base for removal. The mechanical cleaner has a high speed rotating brush-like gas separator element and scraper combination which removes condensed tars and particulates from the produced gas stream. The device is self cleaning in that condensed tars and particulates agglomerate on the high speed rotating bristle elements and, upon reaching adequate size and mass, are thrown off by centrifugal force to the cylindrical sidewall, where scrapers remove accumulated material which falls to the separator base for removal. An electrostatic precipitator having a cylindrical brush-like electrode suspended from one end by an insulated arm, removes remaining particles or aerosols from the product gas.

3. 5,599,360, Feb. 4, 1997, Method for the manufacture of char-containing articles; Robert O. Stillman, 44/522, 530, 590, 595, 596, 598 [IMAGE AVAILABLE]

US PAT NO: 5,599,360 [IMAGE AVAILABLE]

L3: 3 of 13

ABSTRACT:

A process for manufacturing charcoal and intermediate char-containing articles from paper and/or paperboard comprises forming an aqueous pulp of cellulose fibers from the paper or paperboard and blending the aqueous pulp with comminuted char in a dry or slurried state. The resulting mixture may be shaped into any desired form, such, for example, as briquettes, by forcing the mixture into a perforated die or porous mold to form substantially rigid articles. The formed product is dried in a kiln.

4. 5,343,699, Sep. 6, 1994, Method and apparatus for improved operation of internal combustion engines; Roy E. McAlister, 60/273, 309; 123/1A, 3, 151, 169V, 348, 430, 527 [IMAGE AVAILABLE]

US PAT NO: 5,343,699 [IMAGE AVAILABLE]

L3: 4 of 13

ABSTRACT:

A process for operating an internal combustion heat engine which comprises the steps of thermochemically regenerating waste heat rejected by the heat engine by reacting at least one conventional fuel compound containing hydrogen and carbon with an oxygen donor using substantial quantities of the waste heat to produce a mixture of engine-fuel containing substantial quantities of hydrogen and carbon monoxide and utilizing the mixture of engine-fuel to operate an internal combustion engine.

5. 5,330,623, Jul. 19, 1994, Process of **destructive distillation** of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35; 423/449.1; 585/241 [IMAGE AVAILABLE]

## ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

6. 5,224,432, Jul. 6, 1993, Method for retorting organic matter; Isaac H. Milsap, III, 110/341; 48/201; 110/229, 236, 246, 346; 201/1, 25, 27, 32; 432/107 [IMAGE AVAILABLE]

US PAT NO: 5,224,432 [IMAGE AVAILABLE]

L3: 6 of 13

## ABSTRACT:

A method of retorting organic matter including the steps of advancing the organic matter through a chamber in the absence of oxygen, sensing the temperature in the chamber at a plurality of locations along the length of the chamber, individually adjusting the heat generated by a plurality of burners along the length of the chamber in response to the temperature sensed at the locations, utilizing the generated heat to selectively raise the temperature of the organic matter at a plurality of locations along the length of the chamber so as to convert the organic matter into a plurality of byproducts, and burning at least one of the byproducts in the burners.

7. 5,084,141, Jan. 28, 1992, Process of **destructive distillation** of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,084,141 [IMAGE AVAILABLE]

L3: 7 of 13

## ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolyzed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolyzing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

8. 4,308,103, Dec. 29, 1981, Apparatus for the pyrolysis of comminuted solid carbonizable materials; Franz Rotter, 202/117; 48/111; 201/25, 33; 202/135, 137, 265 [IMAGE AVAILABLE]

US PAT NO: 4,308,103 [IMAGE AVAILABLE]

L3: 8 of 13

## ABSTRACT:

Apparatus for effecting the pyrolytic treatment of solid carbonizable materials, such as coal, shredded scrap-**tires**, comminuted municipal waste, sawdust and wood shavings, and the like. The treatment takes place in a cylindrical, horizontally-disposed reactor vessel including a material conveying device which transports the carbonizable materials through the vessel as a moving bed. A heating chamber is arranged coaxially around the reactor vessel and is configured as an annulus of substantially uniform inner diameter and of decreasing outer dimension from its forward end adjacent the materials outlet end of the reaction vessel, to its rearward end, adjacent the materials inlet end of such vessel. The material passing through the reaction vessel is subject to an indirect heat transfer relationship with a burning air-fuel mixture



spirally swirling within the heating chamber and moving in a direction generally counter-current to the material passing through the reaction vessel. The burning air-fuel mixture and combusted gases are progressively constricted and confined by the heating chamber configuration and leave the heating chamber via an exhaust gas exit conduit located at a low point in the heating zone. During its passage through the reaction zone the material to be carbonized is converted by pyrolysis, or high-temperature **destructive distillation**, into combustible gases, liquid hydrocarbons and solid carbonaceous residues.

9. 4,123,332, Oct. 31, 1978, Process and apparatus for carbonizing a comminuted solid carbonizable material; Franz Rotter, 201/15, 25, 27, 33; 202/117, 137; 432/20, 113 [IMAGE AVAILABLE]

US PAT NO: 4,123,332 [IMAGE AVAILABLE]

L3: 9 of 13

ABSTRACT:

Process and apparatus for treating a comminuted solid carbonizable material, such as comminuted municipal waste; sawdust, granulated coal, shredded **tires** and the like wherein the material is caused to be pyrolyzed in a horizontally disposed elongated reaction zone essentially free of any oxygen containing gases at ambient pressure and at a temperature of from 400.degree. C. to 900.degree. C. The material is passed through the reaction zone by paddle-like impellers mounted on a shaft while being subject to an indirect heat transfer relationship via a burning air fuel mixture spirally swirling within a heating zone about the reaction zone and the mixture being withdrawn from a lower portion of the heating zone. During pyrolysis, the material is chemically changed into valuable gaseous, liquid and solid products.

10. 4,118,282, Oct. 3, 1978, Process and apparatus for the **destructive distillation** of high molecular weight organic materials; Floyd D. Wallace, 201/2.5; 48/111, 209; 201/25, 30, 41; 202/105, 120; 208/402 [IMAGE AVAILABLE]

US PAT NO: 4,118,282 [IMAGE AVAILABLE]

L3: 10 of 13

ABSTRACT:

A process and apparatus for the **destructive distillation** of high molecular weight organic materials such as organic wastes, particularly those containing hydrocarbon groups, using ultrasonic and **microwave** generators together to **irradiate**, and molecularly disperse the organic molecules in the organic materials. At least initially a portion of the organic materials are preferably **irradiated** with a laser beam or other initiator to initiate molecular motion in the organic materials and produce elemental carbon in situ from the organic materials so that the process will begin rapidly. Carbon and/or particulate catalysts which promote or increase the absorption of microwaves are preferably admixed with the organic materials. Also described are condenser means for removal of oily higher molecular weight volatilization products and water electrolysis means for providing oxygen for the oxidation of carbon materials in the volatilization products and to provide hydrogen in the gaseous volatilization products in order to provide clean gaseous volatilization products having a high fuel value. Charcoal, tars, resins and pure carbon are also by-products of the process.

11. 4,052,265, Oct. 4, 1977, Process for the pyrolytic treatment of organic, pseudo-organic and inorganic material; Klaus M. Kemp, 201/2.5, 15, 25, 27, 32, 35; 423/DIG.18 [IMAGE AVAILABLE]

US PAT NO: 4,052,265 [IMAGE AVAILABLE]

L3: 11 of 13

ABSTRACT:

Organic and pseudo-organic materials such as waste materials, for example, are processed in a converter system and decomposed into various usable and reusable forms. Inorganic metals and salts are treated